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10/681,794	10/08/2003	Masanari Wakamatsu	04995/120001	6725

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ROSENTHAL & OSHA L.L.P.
Suite 2800
1221 McKinney St.
Houston, TX 77010

EXAMINER

ESTREMSKY, SHERRY LYNN

ART UNIT	PAPER NUMBER
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3681

DATE MAILED: 10/07/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/681,794

Applicant(s)

WAKAMATSU, MASANARI

Examiner

Sherry L Estremsky

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UW

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☐ Responsive to communication(s) filed on ____.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-18 is/are pending in the application.
- 4a) Of the above claim(s) ____ is/are withdrawn from consideration.
- 5) ☒ Claim(s) 1-4 and 6 is/are allowed.
- 6) ☒ Claim(s) 5,7-12,14,15 and 17 is/are rejected.
- 7) ☒ Claim(s) 13,16 and 18 is/are objected to.
- 8) ☐ Claim(s) ____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 22 January 2004 is/are: a) ☐ accepted or b) ☒ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. ____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date 10-8-03.
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. ____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: ____.

DETAILED ACTION

Priority

1. Receipt is acknowledged of papers submitted under 35 U.S.C. 119(a)-(d), which papers have been placed of record in the file.

Drawings

2. Figures 12-15 should be designated by a legend such as --Prior Art-- because only that which is old is illustrated. See MPEP § 608.02(g). Corrected drawings in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. The replacement sheet(s) should be labeled "Replacement Sheet" in the page header (as per 37 CFR 1.121(d)) so as not to obstruct any portion of the drawing figures. If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

Specification

3. The abstract of the disclosure is objected to because in line 3, "generate" should be --generates--. Correction is required. See MPEP § 608.01(b).

Claim Rejections - 35 USC § 112

4. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

5. Claims 5, 7, 8, 11, and 17 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

In claim 5, it is not clear how a decrease rate of torque could be made equivalent to a time constant, a decrease rate of torque being understood as a change (amount) of torque per unit of time.

In claim 7, line 2, "the driving force" is indefinite because it lacks antecedent basis.

In claim 7, line 3, "the engagement force" is indefinite because it lacks antecedent basis. A controlled engagement force of the clutch is first claimed in claim 6.

In claim 8, line 2, "the driving force" is indefinite because it lacks antecedent basis.

In claim 8, line 4, "the front and rear wheels" is indefinite because it lacks antecedent basis. Primary and secondary wheels are claimed in claim 1.

In claim 8, line 4-5, "the engagement force" is indefinite because it lacks antecedent basis. A controlled engagement force of the clutch is first claimed in claim 6.

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In claim 11, line 6, "the electromagnetic force" is indefinite because it lacks antecedent basis. An electromagnetic force is first claimed in claim 10.

In claim 17, "the input" is indefinite because it lacks antecedent basis. An input is first claimed in claim 15.

Claim Rejections - 35 USC § 102

6. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

7. Claims 9, 12, 14, and 15 are rejected under 35 U.S.C. 102(b) as being anticipated by Okamura, U. S. Patent 4,711,333.

Okamura shows in figure 1c a power transfer apparatus 5 of a four-wheel drive vehicle.

Clutch 52 distributes a torque that is generated by an engine E (figure 1a) via transmission, between a primary wheel (through axles 48, 49) to a secondary wheel (through drive shaft 55).

Gear shift status detection means 166, which detects the state of gear shift of the transmission (column 7, lines 14-15), is shown in figure 3a.

A control means is shown in figure 3c (180, 181, 182, 133) for controlling the clutch 52 in such a manner that the torque to be transmitted by the clutch attains a target value (the transfer clutch torque capacity calculated in 180) in accordance with a gear shift status signal detected by

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the gear shaft status detection means. Figure 5b shows a portion of the control routine, where the gear shift status, Ds or D, determines the target torque to be transmitted by the transfer clutch, the numbers in parenthesis representing the percentage of engine torque to be transmitted to the secondary wheel. This is described in part in column 9, lines 32-45 (using ranges D2 and D3 instead of Ds and D).

(claim 9)

The shift range switch 166 is a means for detecting a gear shifting condition of the transmission.

The controller receives an input signal indicating the gear shifting condition (column 7, lines 49-52) and generates a control signal that, depending on the previous value of the transmitted torque, reduces a torque transmitted by the clutch 52 to a target value, the calculated transfer clutch torque capacity (column 7, lines 60-65; in figure 5b, the values of 20, 30, and 50 percent represent a reduction in torque from 60 percent, for example).

(claim 12)

The gear shifting condition is the state of the gear shift of the transmission, Ds or D.

(claim 14)

The control unit 160 and the solenoid operated valve shown in figures 3a-3c constitute a device for controlling torque transmitted by the clutch 52.

The controller generates a control signal (in the duty ratio setting section 181, fig. 3c) based on an input received from a transmission (from shift range switch 166, fig. 3a). The control signal is output to the clutch 52 to decrease the torque to a target value, represented by "ENERGIZE SOLENOID VALVE" in figure 5b.

(claim 15)

Claim Rejections - 35 USC § 103

8. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

9. Claims 10 and 11 are rejected under 35 U.S.C. 103(a) as being unpatentable over Okamura in view of Fogelberg, U. S. Patent 4,718,303.

Okamura discloses a power transfer apparatus as discussed in the rejection of claim 9 above, but does not disclose that the clutch is controlled by an electromagnetic force, nor that a differential is disposed between the primary and secondary wheels.

Fogelberg discloses a power transfer apparatus 24 of a four-wheel drive vehicle 10 including a clutch 46 that distributes a torque, generated by an engine 20 via transmission 22, between a primary wheel 12 to a secondary wheel 14. A control means ("CONTROL SYSTEM" in figure 3) controls the clutch in such a manner that the torque to be transmitted by the clutch attains a target value (column 2, lines 47-50 and column 6, lines 6-19).

The torque is transmitted in accordance with an engagement force of the clutch 46 while an engagement force of the clutch is controlled by an electromagnetic force derived from energization control (column 1, lines 59-61; column 4, lines 53-65; column 6, lines 4-9).

The torque is transmitted while a differential motion of a differential 38 disposed between the primary wheel and the secondary wheel is limited by controlling engagement force

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of the clutch 46 that is controlled by the electromagnetic force derived from energization control.
(column 2, lines 18-24; column 4, lines 53-55)

It would have been obvious to a person of ordinary skill in the art at the time the invention was made to modify Okamura to make the clutch an electromagnetic clutch which limits differential motion of a differential in view of Fogelberg because an electromagnetic clutch gives the ability to control or modulate torque level such that the transfer apparatus may easily and readily adapt to changing vehicle conditions without detracting from its four wheel drive capabilities (column 1, lines 61-64), an electromagnetic clutch gives the ability to bias torque to a desired level to improve traction control and provides programmable vehicle handling characteristics (column 2, lines 47-50), the use of a differential (full-time four wheel drive) provides drive to the front and rear axles at all times while allowing relative rotation between the axles to accommodate steering geometry (column 1, lines 17-21), and the clutch being controlled to limit differential motion of the differential allows full-time four wheel drive which can respond to changing vehicle conditions (column 1, lines 49-64).

Allowable Subject Matter

10. Claims 1-4 and 6 are allowed.

11. Claims 5, 7, and 8 would be allowable if rewritten or amended to overcome the rejection(s) under 35 U.S.C. 112, 2nd paragraph, set forth in this Office action.

12. Claims 13, 16, and 18 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

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13. Claim 17 would be allowable if rewritten to overcome the rejection(s) under 35 U.S.C. 112, 2nd paragraph, set forth in this Office action and to include all of the limitations of the base claim and any intervening claims.

14. The following is a statement of reasons for the indication of allowable subject matter:

No reference nor combination of references was found which teaches a power apparatus of a four-wheel drive vehicle including a clutch, wherein the torque to be transmitted by the clutch is decreased to a target value in accordance with an inversion signal.

Conclusion

15. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

U. S. Patent 4,674,610 (Sakakiyama) June 1987 - discloses a vehicle with an electromagnetic clutch in which the torque of the clutch is decreased temporarily when a particular range of the transmission is selected.

U. S. Patent 4,715,467 (Sakai) December 1987 - discloses a four-wheel drive transfer clutch controlled to a target torque calculated in part according to a detected/calculated transmission ratio to prevent tight corner braking.

U. S. Patent 4,909,345 (Iwatsuki et al.) March 1990 - discloses a four-wheel drive center differential and clutch, where hydraulic actuation of the clutch is modified according to the transmission manual valve being switched to reverse or low range.

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U. S. Patent 5,564,518 (Ishii et al.) October 1996 - discloses a transfer case for a four-wheel drive vehicle, including a two-stage speed change mechanism and a clutch. When the speed change mechanism is shifted to high speed, the clutch is disengaged.

U. S. Patent 5,875,865 (Wakahara et al.) March 1999 - discloses a hydraulic pressure operated transfer clutch for which the target torque to be transmitted by the clutch is based on a high speed shift position signal.


U. S. Patent 6,722,482 (Takuno) April 2004 - discloses an electromagnetic clutch used in a transfer apparatus for which the torque transmitted by the clutch is reduced when differential rotation of the rotary members of the clutch are reversed.

16. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Sherry L Estremsky whose telephone number is (703) 308-2164. The examiner can normally be reached on Tuesday and Friday from 7:30 a.m. to 6:00 p.m.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Charles Marmor can be reached on (703) 308-0830. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

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SHERRY ESTREMSKY
PRIMARY EXAMINER
AU 3681 10-1-04